

## EFFECT OF DIFFERENT LEVELS OF IRRIGATION AND PHOSPHORUS ON THE GRAIN YIELD OF SOYBEAN CO. 1.

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Field experiments were conducted during summer and South west monsoon of 1981 at the Agriculture Research Station, Bhavanisagar to study the effect of different levels of irrigation and phosphorus on the grain yield of soybean Co 1. The results revealed that irrigating the crop once in eight days interval at 0.80 IW/CPE ratio and application of 120 kg P<sub>2</sub> O<sub>5</sub>/ha recorded significantly higher grain yield in both the seasons.

Field experiments were conducted in summer and South West monsoon of 1981 with the newly released CO. 1 soybean variety to find out the optimum IW / CPE (Irrigation water depth/cumulative pan evaporation) ratio of irrigation schedule and to fix up the optimum phosphorus required for the crop. The experiments were conducted at the Agricultural Research Station, Bhavanisagar which is situated at 11° 30' N, 77° E and at an attitude of 426.72 m above mean sea level. The soybean was raised in a well drained red loam soil low in available N (200 kg/ha) P<sub>2</sub> O<sub>5</sub> (9.0 kg/ha) and K<sub>2</sub> O (112 kg/ha) in both the seasons. The pH and EC of the soil were 6.8 and 0.3 m. mhos/cm respectively.

The trial was laid out in factorial randomised block design with three replications. Three levels of irrigation regimes viz., I<sub>1</sub> (0.40 IW/CPE ratio), I<sub>2</sub> - (0.60 IW/CPE ratio) and I<sub>3</sub> - (0.80 IW/CPE ratio) and four levels of phosphorus viz., P<sub>0</sub> - (0 kg P<sub>2</sub> O<sub>5</sub>

ha, P<sub>1</sub> - (40 kg P<sub>2</sub> O<sub>5</sub>/ha), P<sub>2</sub> - (80 kg P<sub>2</sub> O<sub>5</sub>/ha and P<sub>3</sub> - (120 kg P<sub>2</sub> O<sub>5</sub>/ha) formed the treatments. Daily cumulative pan evaporation was recorded from the USWB class A pan evaporimeter. When ever the ratio between the depth of irrigation water (IW) and the cumulative pan evaporation (CPE) reaches the required ratio, irrigation was given to the plots according to the treatment. The available soil moisture was estimated gravimetrically. The field capacity and wilting point of the experimental area were 20.5 and 12.5 percent respectively. The quantity of water applied was measured through a 90° 'V' notch. The depth of water applied was 4 cm during summer and 5 cm South west monsoon.

The summer crop was sown on 2-2-1981 and the South West monsoon crop on 10.6.1981. Sowing was done by dibbling the seeds in line with a spacing of 30 x 10 cm. Entire quantity of P<sub>2</sub> O<sub>5</sub> was applied basally as per the treatment before sowing with

40 kg N and 40 kg K<sub>2</sub>O/ha. The summer and South West monsoon crops were harvested on 7-5-1981 and 18-9-1981 respectively. The number of pods per plant, hundred grain weight and grain yield were recorded and are presented in Table 1. The consumptive use of water and water use efficiency of grain were also worked out and given in the Table 1.

In both summer and South West monsoon seasons, irrigating the crop once in 8 days at 0.80 IW/CPE ratio recorded higher grain yields of 1769 and 2022 kg/ha respectively. This may probably be due to the availability of water in sufficient amounts to the crops at 0.80 IW/CPE ratio irrigation regime. Application of phosphorus at 120kg P<sub>2</sub>O<sub>5</sub>/ha has resulted in the maximum grain yield of 1657 kg/ha in summer and 2098 kg/ha in South West monsoon seasons. Phosphorus at 120 kg P<sub>2</sub>O<sub>5</sub>/ha considerably given the increased pod number per plant and increased hundred grain weight in both the seasons and this might have resulted in the increased grain yields. Similar findings in soybean were also observed by Singh and Singh (1968), Katti *et al.* (1970) and Ravantar and Badhe (1977). Comparing the grain yield in both the seasons, the South West monsoon crop had given higher yield than summer crop. This may be due to favourable weather prevailed during South West monsoon season since soybean required temperate climate for its better growth and yield. The average maximum and minimum temperature as 38.9° and 19.1°C during

summer and 33.8° and 25.0° C during South West monsoon seasons. Out of the total rainfall received, 21.8 per cent of rainfall during summer and 34.5 per cent rainfall during South West monsoon seasons were received. Evidences had shown that the crop raised in the month of June - July recorded higher yield than the crop raised during summer indicating that this crop required a moderate temperature. The water use efficiency was higher in the treatment of 0.40 IW/CPE ratio (once in 16 days) during both the seasons. The present study had indicated that scheduling irrigation using the USWB class A pan evaporimeter is a feasibility on a broader perspective and when the IW/CPE ratio arrives to a value of 0.80 (once in 8 days) the soybean had to be irrigated along with application of 120 kg P<sub>2</sub>O<sub>5</sub>/ha for optimum yield.

#### REFERENCES

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Table 1 Effect of irrigation regimes and phosphorus levels on CO. 1 Soybean.

Treatment	No. of pods/ plant	Hundred grain weight (g)	Grain yield (kg/ha)	Consum- ptive use (mm)	Water use effici- ency (kg/ mm/ha)	No. of irri- gations
Summer 1981						
<i>Irrigation levels</i>						
I <sub>1</sub> -0.40 IW/CPE ratio	37	38.5	1346	293	4.59	6
I <sub>2</sub> -0.60 IW/CPE ratio	31	40.3	1340	373	3.46	8
I <sub>3</sub> -0.80 IW/CPE ratio	36	42.2	1769	453	3.57	10
S. E.	2	0.5	38			
C. D. (5%)	N. S.	1.4	111			
<i>Phosphorus levels</i>						
P <sub>0</sub> -0 kg/ha	36	38.2	1318			
P <sub>1</sub> -40 kg/ha	32	39.4	1415			
P <sub>2</sub> -80 kg/ha	35	41.2	1551			
P <sub>3</sub> -120 kg/ha	35	43.0	1657			
C. E.	3	0.5	44			
C. D. (5%)	N. S.	1.6	128			
South West monsoon 1981						
<i>Irrigation levels</i>						
I <sub>1</sub> -0.40 IW/CPE ratio	51	48.6	1693	470.4	3.60	6
I <sub>2</sub> -0.60 IW/CPE ratio	48	50.3	1775	570.4	3.13	8
I <sub>3</sub> -0.80 IW/CPE ratio	51	51.9	2022	670.4	3.00	10
S. E.	3	0.5	9			
C. D. (4%)	N. S.	1.4	27			
<i>Phosphorus levels</i>						
P <sub>0</sub> -0 kg/ha	41	48.0	1598			
P <sub>1</sub> -40 kg/ha	48	49.5	1742			
P <sub>2</sub> -80 kg/ha	51	51.2	1883			
P <sub>3</sub> -120 kg/ha	60	52.2	2099			
S. E.	4	0.6	10			
C. D. (5%)	11	1.6	31			

N. S. Not significant.